slashed the initiative three times this decade—from $17 billion to $7.5 billion—saying it was too risky and unjustifiably expensive. Harris is worried it will happen again: "Any more cuts and we will drastically reduce our objectives and probably lose some international partners who are helping us fund it now."

Decline in Pesticide Use by Canadian Farmers

Farmers in Ontario are spraying smaller amounts of pesticides on their crops than in the past. From 1983 to 1993, pesticide use dropped by a dramatic 28.3%, according to the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA). By comparison, pesticide use in the United States fell 15% between 1982 and 1992. Under the Food Systems 2002 project, OMAFRA has worked with farmers and agricultural and environmental groups since 1987 to cut pesticide use in half by the year 2002.

Declining North American pesticide use resulted, in part, from the application of environmentally "safer" chemicals, although greater amounts of such chemicals might be necessary to achieve the same effect. Today, Ontario farmers use one-third as much atrazine on corn crops to control quackgrass as they did 10 years ago. This one million kilogram decrease represents nearly half of Ontario's total reduction in pesticide use. Many Ontario growers, concerned about atrazine's environmental persistence, eliminated fall applications. On many farms, newer, short-lived herbicides, sprayed at rates of grams per acre rather than kilograms per acre, have replaced atrazine, said Ken Hough of the Ontario Corn Producers Association. There is evidence of a similar trend in the United States, where reduced herbicide use accounts for over 60% of the total decline in pesticide use.

In the early 1980s, the farming community's rising concern about escalating pesticide applications prompted the Ontario government to support lower pesticide use, said Jeff Wilson, chairman of AGCare (Agricultural Groups Concerned About Resources and the Environment), which represents 45,000 growers in Ontario. "It was an evolutionary process, beginning with initiatives from growers," said Wilson, "without a Big Brother or heavy-hand syndrome." Bruce Archibald, manager of OMAFRA's Environmental Health Program, concurs. "It was a win–win situation, with a shift in thinking on the part of the growers and the government providing resources."

Archibald credits much of Ontario's reduced pesticide use to the certification program for purchasing pesticides. Initiated as a voluntary program in 1988, certification became mandatory throughout Ontario in 1991 at the growers' request. To become certified, growers attend a full-day course on proper label reading, mixing, and applying pesticides, and pass an exam every three years. Before this awareness-raising initiative, said Wilson, farmers applied up to 20% more pesticide to their crops than necessary because of poorly calibrated spraying equipment. In the United States, applying a "restricted use" pesticide requires a license. However, many commonly used pesticides are not restricted, and licensing requirements, developed by each state, vary throughout the country.

Spraying Systems Co.

Spraying for certain. Properly calibrated spraying equipment helps farmers ensure minimum amounts of pesticides necessary are used.

Ontario's certification course also introduces the principles of integrated pest management (IPM), such as crop rotation, mechanical pest removal, use of natural pest predators, and targeted use of pesticides, to help Ontario farmers manage pests more efficiently. During the growing season, farmers using IPM monitor their crops for the appearance of pests or weeds. When pest infestation exceeds a threshold level, the farmer applies a pesticide specifically targeted for that pest. This approach contrasts with traditional methods of applying a broad-spectrum pesticide several times a year.

Wilson, a potato and apple grower, pays $14 an acre to have scouts monitor his crops for pests. A pesticide specialist provided by OMAFRA sets threshold criteria and advises him on the timing of pesticide applications. Using this service has eliminated two pesticide sprayings per growing season, which, he said, saves money and protects the soil and water from excess toxic chemicals.

In 1993, the Clinton administration set a goal of implementing IPM practices on 75% of U.S. cropland by the year 2000. By the end of the 1993 fiscal year, formal integrated crop management agreements (which integrate IPM with soil conservation and nutrient management) had been implemented between the USDA and 1092 farms, covering 176,000 acres. Although this represents only one-tenth of 1% of the nation's total cropland, a survey by the U.S. Department of Agriculture indicates that at least some IPM practices are being used on a large portion of the farm acreage in America. The results of this survey, released in September of 1994 in an agricultural information bulletin, show that some form of IPM is being used on 60% of planted acreage of fruits and vegetables and 75– 80% of field crop (corn and potato) acreage.

Historically, the USDA taught farmers to use pesticides as an insurance policy for maintaining crop yields. Getting farmers to change their crop protection methods requires re-education, said Betty Marose, an IPM specialist and Maryland Cooperative Extension agent. "A lot can be done if you have the resources for an extension agent to demonstrate these methods," said Marose, "but it requires time and money." Unfortunately, funding for IPM education and implementation has remained level for the past 10 years.

Ontario's pesticide-container recycling program also contributed to reduced pesticide use. When containers are triple-rinsed before recycling, the rinse, containing as much pesticide as 6% of the tank volume, is saved and applied to crops. A similar U.S. program, initiated by pesticide vendors in 1992, now has participation in 45 states.

With seven years to go, Ontario is well on its way to meeting the Food Systems 2002 goal. Future reductions in pesticide use will be fine tuning, Wilson says, which depends on new research and technology.

Is Bottled Water Better?

Bottled water is one of the fastest-growing beverages on the market. In 1992, consumption of bottled water surpassed that of tea, wine, liquor, powdered drinks, and juice. In 1993, 2,257.7 million gallons of bottled water were sold in the United States, according to Lisa Prats, vice president of the International Bottled Water Association, the trade association of the bottled water industry. Consumers of bottled water cite taste as their primary reason for buying bottled water, but other reasons are safety and concerns about chemicals in tap water, says Prats. The question is, is bottled water worth the difference in cost, at an average cost of 700 times more than plain tap water?

A majority of Americans say they are pleased with the quality of the water that comes from their taps, according to a 1993 national survey on how Americans rate their drinking water by the American Water Works Association. As reported in the winter 1994 issue of *On Tap*, the AWWA survey found that 62% of Americans rate the quality of their drinking water as good (41%) or excellent (21%), while 75% believe that the water in their local community meets (57%) or exceeds (18%) the federal standards for quality and safety. Still, the AWWA survey found that 43% of respondents drink bottled water at least some of the time, although tap water is still their main source of drinking water, and 8% use bottled water exclusively.

Strict regulations govern both bottled and tap water industries. Unlike well water, which isn't subject to regulation, public water supplies are regulated by the EPA. Bottled water, on the other hand, is considered a food, and is regulated by the Food and Drug Administration. In 1989, the Environmental Policy Institute concluded that the "regulations for bottled water were not on par with those for tap water," say Linda Allen and Jeannie Darby of the University of California-Davis in an April 1994 article in the *Journal of Environmental Health*. In addition, regulations for tap and bottled water are not standardized: tap water has uniform national regulations, but "bottled water is still subject to federal regulations with limited applicability and inconsistent state regulations," say Allen and Darby.

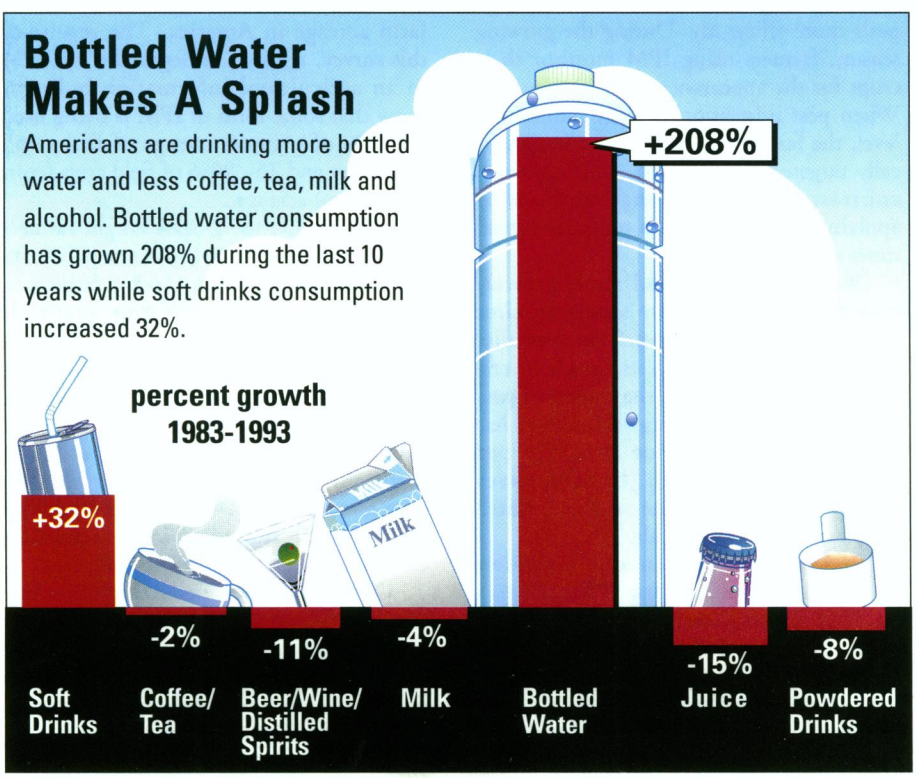
In 1989 the Environmental Policy Institute concluded that bottled water is not necessarily any safer than tap water. In fact, EPI says that storage of bottled water, often for weeks or months at room temperature and higher, promotes bacterial growth in the water. Elevated levels of bacteria in water can cause health problems for infants, the elderly, and immunocompromised people. Still, Stephen Schaub, senior microbiologist in the EPA's Office of Groundwater and Drinking Water, stresses that although studies are inconclusive on the issue, bacteria in bottled water doesn't seem to be a significant problem.

However, an incident in February 1990, in which benzene, a chemical known to cause cancer in humans, was detected in bottles of Perrier at levels that exceeded by four times the EPA standards for tap water, points out that bottled water may have other problems. Perrier recalled more than 170 million bottles as a result of the contamination, and the incident prompted the U.S. General Accounting Office to charge the FDA with failing to set "adequate safety standards for chemical contamination of bottled water."

In 1994, the FDA passed regulations that impose the same standards on bottled water as the EPA imposes on tap water. An exception is lead: lead content may not exceed 5 parts per billion in bottled water, whereas EPA limits lead in tap water to 15 parts per billion. Bottled water may help to bypass other potential problems brought about by the practice of public water suppliers of adding chlorine to drinking water to remove bacteria. Although chlorine kills bacteria effectively, it can react with organic matter in water to form by-products such as trihalomethanes which have been linked to bladder and rectal cancers. Chlorine is not used as a disinfectant in bottled water, according to Prats.

Despite almost half (49%) of the respondents to the AWWA survey saying they believe bottled and tap water to be equal in quality, 37% responded that bottled water is safer and healthier to drink than tap water, as opposed to only 10% who said the opposite, a perception most chalk up to clever advertising by the bottled water industry.

Americans drink bottled water primarily for aesthetic reasons: the taste, smell, and appearance of the water. Tap water supplies are often treated with chlorine, which can leave an aftertaste or odor. Bottled water, on the other hand, is usually treated by ozonation and filtration, processes that leave no aftertaste. Besides taste considerations, the EPA says that drinking bottled water is appropriate when the levels of contaminants in the local water supply exceed health standards, and when household problems, such as lead in the pipes, can cause contamination. Otherwise, researchers argue that bottled water just isn't worth the price, especially considering that it must be purchased, transported, and stored by the consumer. Canadian water researcher Pierre Payment, of the Armand-Frappier Institute, said in an article by the Associated Press that municipalities should advertise the quality



Source: Industry Analyst John C. Maxwell, Beverage Industry's Annual Soft Drink Report, March 1994.